



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

$$\left(\frac{dz}{dt}\right)^2 = \frac{g}{l}(z^2 - a^2), \text{ since } z=a \text{ when } \frac{dz}{dt}=0.$$

$$\therefore t = \sqrt{\frac{l}{g}} \int \frac{dz}{\sqrt{(z^2 - a^2)}} = \sqrt{\frac{l}{g}} \log \frac{z + \sqrt{(z^2 - a^2)}}{a},$$

if $t=0$ when $z=a$. Putting $z=x$ we get the required time.

Also we have, [Tension at peg] δt =momentum generated by tension in time $\delta t = mv\delta t, v = mv^2\delta t$.

$$\therefore \text{Tension at peg} = m \left(\frac{dx}{dt}\right)^2 = \frac{mg}{l}(x^2 - a^2), \text{ when } z=x.$$

Also solved by S. A. Corey, and G. B. M. Zerr.

MISCELLANEOUS.

152. Proposed by J. EDWARD SANDERS, Reinersville, Ohio.

A conductor, the equation of the surface of which is

$$\frac{x^2}{25} + \frac{y^2}{16} + \frac{z^2}{9} = 1,$$

is charged with 80 units of electricity, what is the density at a point for which $x=3, y=3$? If the density of this point be a , what is the whole charge on the ellipsoid? [From Peirce's *Potential Functions*, example 165, p. 388.]

Solution by M. E. GRABER, A. M., Tiffin, Ohio.

The mass of an ellipsoidal shell is $\frac{4}{3}\pi\rho d(abc) = 4\pi Mabc$, and $Q = A4\pi\mu abc\rho$. $s = A\mu\theta$ and $\theta = \mu p$ where p is the perpendicular from the origin on the tangent plane. Then the density at any point is $Qp/4\pi abc$. The value of z for a point on the ellipsoid for which $x=3$ and $y=3$, is $\frac{3\sqrt{31}}{20}$ and the equation of the tangent plane is $\frac{3x}{25} + \frac{3y}{16} + \frac{3\sqrt{31}}{9}z = 1$. The perpendicular from $(0, 0, 0)$ is $\frac{D}{\sqrt{(A^2 + B^2 + C^2)}}$ or $4.2 +$. Therefore the density at $(3, 3, \frac{3\sqrt{21}}{20}) = \frac{80.(4.2)}{4\pi(5.43)} = .445 +$. If the density of this part be a ,

$$Q = \frac{4\pi a(5.43)}{4.2 +} = \frac{240\pi a}{4.2 +}.$$

Also solved by G. B. M. Zerr, and the Proposer.

153. Proposed by CHRISTIAN HORNUNG, A. M., Heidelberg University, Tiffin, Ohio.

Two men start from Columbus, Ohio, at the same time; one travels east and the other west. They travel at the rate of 4 miles an hour from sunrise to sunset each day until they meet. Where will they meet and what distance will each have traveled?

Solution by A. H. HOLMES, Brunswick, Me.

We assume that Columbus, Ohio, is situated at 40° N. latitude, and 83° W. longitude. $2\pi x$ = distance round the earth at 40° latitude. Put $a = \frac{1}{2}$ equatorial diameter of the earth, and $b = \frac{1}{2}$ polar diameter of the earth.

Then $a^2 y^2 + b^2 x^2 = a^2 b^2$. $y = x \tan 40^\circ$.

$\therefore 3962.8^2 (.704088x^2) + 3949.57^2 x^2 = 3962.8^2 \times 3949.57^2$. $\therefore x = 3031.48$.

Then A going east will have travelled when he meets B, $\frac{8\pi x - 384}{16\pi x} \times 2\pi x = \pi x - 48$; and B, $\pi x + 48$ miles.

$\therefore$ A travelled $9475.6899 +$ miles, B travelled $9571.6899 +$ miles. A will have passed $179^\circ 5'$ of longitude.*

Hence they will meet at a point in the Eastern Desert of the Chinese Empire situated at 40° N. latitude, and $96^\circ 5'$ E. longitude.

Also solved by L. E. Newcomb, J. Scheffer, and G. B. M. Zerr.

154. Proposed by D. BIDDLE (Unsolved problem in the Educational Times, London).

Prove that the proper angle at which to cross a street when a person wishes to continue his course on the other side, and the roadway is n times as muddy as the pavement, is that of which the sine is $(n^2 - 1)/(n^2 + 1)$.

Solution by G. B. M. ZERR, A. M., Ph. D., Parsons, W. Va.

Since the roadway is n times as muddy as the pavement, the velocity in the roadway is $1/n$ th the velocity on the pavement.

Let A be the position of the person, B the point directly opposite him on the other side of the roadway, C the point where he reaches the other side, $AB = a$, $\angle CAB = \frac{1}{2}\pi - \theta$. Also let v be his velocity on the pavement. Then to get Mr. Biddle's result, the time to go over AB plus the time to go over BC , or

$$\frac{n \cdot AB}{v} + \frac{BC}{v} = \frac{n \cdot AC}{v}. \quad \therefore \frac{na}{v} + \frac{a \cot \theta}{v} = \frac{nac \operatorname{cosec} \theta}{v}.$$

$$\therefore n \sin \theta + \cos \theta = n. \quad \therefore \sin \theta = \frac{n^2 - 1}{n^2 + 1}.$$

I prefer the following result: Let D be the person's goal, $BD = b$, $AC = a \operatorname{cosec} \theta$, $BC = a \cot \theta$.

$$\text{Then } \frac{nac \operatorname{cosec} \theta}{v} + \frac{b - a \cot \theta}{v} = \text{minimum.}$$

$$\therefore n \operatorname{cosec} \theta \cot \theta = \operatorname{cosec}^2 \theta \text{ or } \cos \theta = 1/n. \quad \therefore \sin \theta = \sqrt{(n^2 - 1)/n}.$$

Also solved by A. H. Holmes, and J. Scheffer.

*Mr. Newcomb in his solution used more exact assumptions in regard to the latitude of Columbus, and tabulated the data showing the progress of A and B on successive days. The result of his long solution is $179^\circ 33' 13.1''$ East of Columbus.